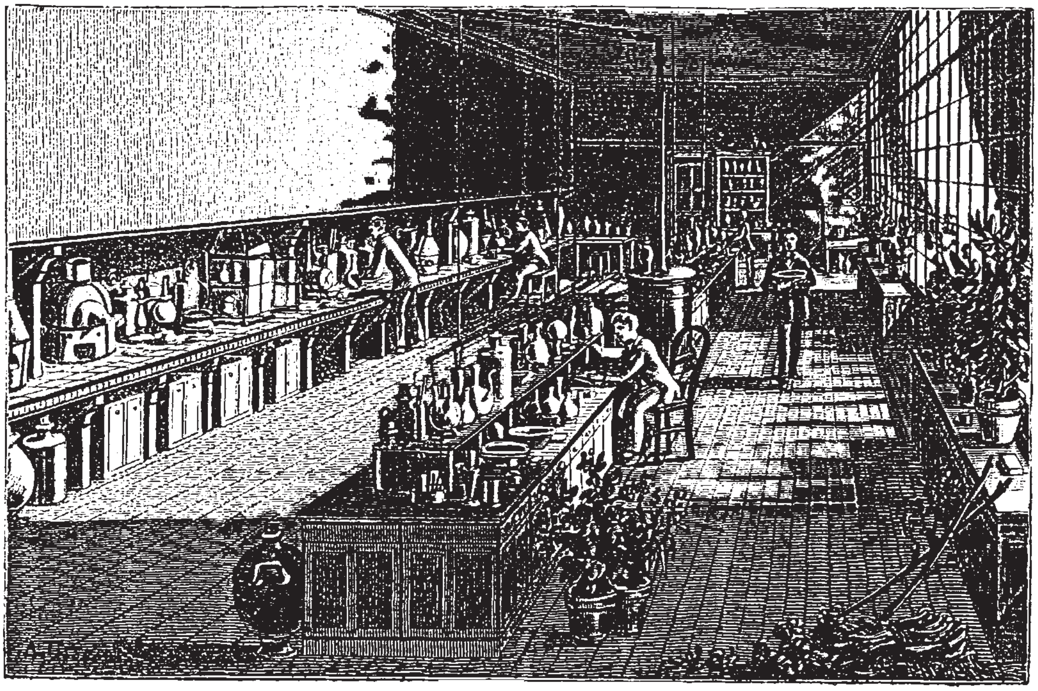
THE NEW LABORATORIES OF THE NATURAL HISTORY MUSEUM, PARIS*

IN order to provide every facility for the higher scientific education, and induce young men to devote themselves to scientific research, the French Government have established a school of advanced study, in the form of a suite of laboratories in which young men receive a practical education *par excellence*; they are trained there in manipulations and dissections, and initiated in all those delicacies of touch, those turns of the wrist, which are traditional in the green-rooms (*coulisses*) of science, but which cannot be taught in the theatre.

Without noticing at present the zoological laboratories under the zealous management of M. A. Milne-Edwards, and through which have already passed several students desirous of taking the degree of licentiate in natural science; or the physiological laboratory, at the head of which is the eminent M. Claude Bernard, or the laboratories of comparative anatomy and geology, we shall take the reader through the Rue de Buffon, into the new buildings which contain the chemical laboratory of M. Fremy, the botanical laboratory of M. Brongniart, and the laboratory of vegetable physiology and anatomy of M. Decaisne.

M. Fremy had already, for many years, assembled his pupils in the old Museum buildings, badly lighted, small, confined, where they were very uncomfortable; now, on the contrary, they are installed in a new building where they are furnished with every convenience for their work.

As soon as we enter the court, we find on the right and left, platforms (*paillasses*) in the open air with a glass roof, where all experiments can be made, of a nature to taint the atmosphere of the laboratories. On each side are ranged buildings, one specially intended for beginners, the other for more advanced students. The latter is provided with furnaces, by means of which the highest temperatures may be obtained. Each pupil has his place marked out, his name inscribed upon the frame above his work-table, which is furnished with a set of drawers and a rack for holding the *matériel* appropriate for his special work. The laboratory of the assistant naturalist, M. Terreil, and the preparatory laboratory, are situated in a line with the pupils' laboratory.



Laboratory of Vegetable Physiology in the Paris Museum of Natural History

The bottom of the court opens into a lobby which communicates with the two wings of the building; here are conveniences for depositing the clothes which the students exchange for their working garb on entering the laboratory. A door in this corridor gives access to an antechamber into which open the laboratories of M. Fremy, and that of his special assistant, placed side by side.

The first and second stories of the buildings on the right and in the centre are intended for the botanists of M. Brongniart, who have not yet obtained complete possession; the left wing belongs as yet to chemistry; on the first story is the lecture-hall, on the second the library.

M. Fremy has realised the foundation of a true school of chemistry; not only does he lavish on his pupils his instructions, but he sees that their education is complete. Every day at three o'clock work in the laboratory ceases, and oral instruction begins, the lecture-hall, moreover, being open to the public. M. Fremy gives instruction in general chemistry, with a well-known power of exposition; M. Terreil has charge of analysis; M. Ed. Becquerel, of the Institute, initiates the students in the management of physical apparatus; Jannetaz, assistant in mineralogy, gives instruction in that branch; and lastly, M. Stanislas Meunier, already known by his researches upon meteorites, treats of all the parts of geology which are connected with chemistry. Examinations are held by the lecturers for the purpose of testing the work of the pupils, who are rewarded at

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the close of their studies with certificates testifying to their diligence and their acquirements.

All this instruction is absolutely gratuitous. M. Fremy wishes to remain faithful to the old motto of the museum, "Tout est gratuit dans l'établissement," though this excessive liberality is perhaps open to criticism.

Behind the magnificent chemical rooms we found the modest laboratory of M. Decaisne. Descending a few steps we reach a garden set apart to experiments in culture, having on the left a glazed gallery: this is the laboratory of vegetable anatomy and physiology. M. Decaisne superintends and advises the anatomists during his daily visits; M. Dehérain, who is well known for his researches in agricultural chemistry and vegetable physiology, directs the work of the laboratory represented in our illustration. It is a long apartment, perfectly lighted, into which stream the rays of the sun, that plays so important a part in all the phenomena of vegetable life; on the right, ventilators carry off all the strong-smelling gases which the chemist is obliged to employ; long tables, furnished with earthenware vessels, extend along the middle of the apartments as well as underneath the windows. Everything is scrupulously tidy.

This laboratory of agricultural chemistry will no doubt yield to agricultural chemistry important results. The man of science will have here the means of preparing at pleasure true artificial soils; he will see plants of various kinds grow under his eyes; he will nourish them with organic and mineral substances whose composition is known to him. He will follow step by step the various phases of vegetable life; he will study the yet mysterious laws of vegetable life. Indeed it is difficult to state all the powerful resources that are in the hands of the experimenter.

AËRIAL SPECTRES

IN an article on the above subject in *La Nature*, No. 4, M. G. Tissandier gives the following account of what he saw from a balloon on February 16, last.

At mid-day we quitted the earth wrapped in a thick mantle of fog; after traversing the mass of the clouds, we were suddenly dazzled by torrents of light which shot from a tropical sun, a stream of fire, in the midst of an azure sky. Neither the *mer de glace* nor the snowy fields of the Alps, give an idea of the plateau of mist which stretched under the car like a glassy circle, in which valleys of silver appeared in the midst of flakes of gold. Neither the sea at sunset nor the ocean waves when lighted up by the orb of day at noon, approach in splendour this array of circular cumulus, but which have, in addition, "the light that never was on sea or land."

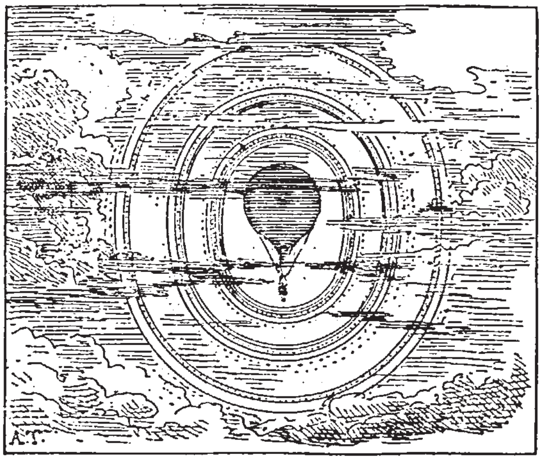
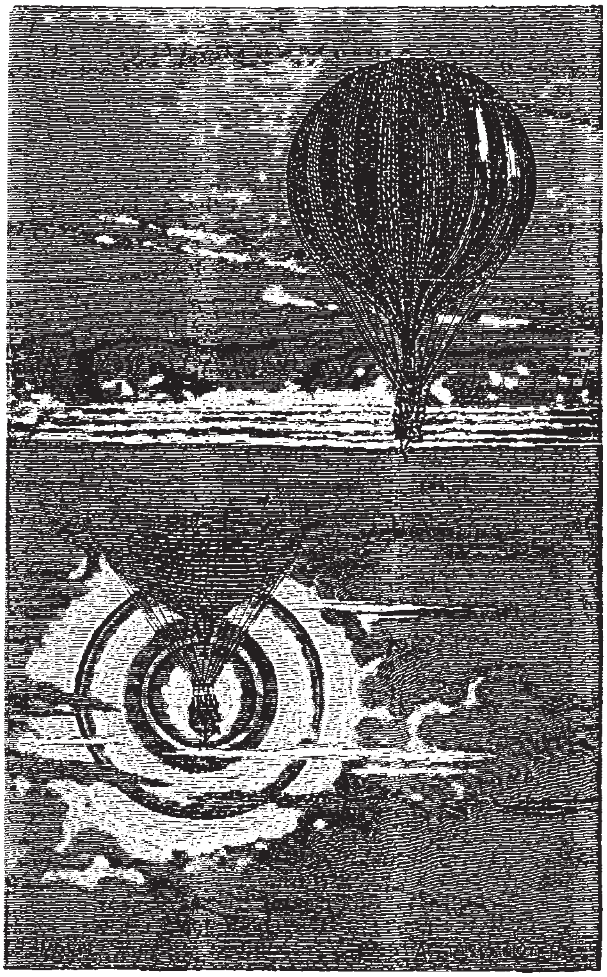


FIG. 1.—Shadow of a balloon surrounded by three aureoles.

When our balloon had passed about 50 metres beyond the plain of clouds, its shadow was projected with remarkable precision, and a magnificent circular rainbow appeared round the shadow of the car. Fig. 2 gives a very exact idea of the phenomenon. The shadow of the car formed the centre of rainbow-coloured concentric circles, in which were distinctly seen the seven colours of the spectrum, violet, indigo, blue, green, yellow, orange, and red. The violet was inside, and the red on the outside, these two colours being at the same time those which were seen with the greatest distinctness. We were, at the time the observation was made, at a height of 1,350 metres above the level of the sea.



G. 2.—Optical phenomenon observed from a balloon.

The balloon, the gas in which expanded under the heat of the sun, continued to rise rapidly in the air, its shadow visibly diminishing; soon, at a height of 1,700 metres, the rainbow-circle enveloped it entirely, and disappeared from around the car. A little later, at about 1^h 35^m, we approached the bed of clouds, and the shadow was girt this time by three silver-coloured aurioles, elliptical and concentric, as shown in Fig. 1.

Nothing can give an idea of the purity of these shadows, which are cut out in an opaline mist, or of the delicacy of tone of the rainbow which surrounds them. The complete silence which reigns in the aërial regions, where this play of light is seen, the absolute calm which

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